



Where Women and Girls are In Science, Engineering and Technology

As the economy in the United States and the world grows more reliant on a technologically literate work force, the nation cannot afford to overlook the talent and potential contributions of over half the population. Women and girls and others underrepresented in the sciences offer valuable new perspectives that will affect both the goals and practices of technological work and research.

Much work has been done, particularly in the last two decades, to pinpoint the needs of women and girls in science, engineering and technology and to develop programs and interventions to encourage their progress. However, changes need to reach deeply into the culture to permanently alter the institutions where science is taught and practiced. *Balancing the Equation: Where Women and Girls Are in Science, Engineering and Technology*, a report by the National Council for Research on Women, reports far-reaching strategies that women, and men, have developed to turn programmatic progress into lasting change.

The 20th century has seen women struggle for recognition as scientists and engineers, some with notable success. Programs beginning in the 1970s, with increasing momentum in the 1990s, recognize an uneven playing field and attempt to improve women's chances for success. Several events and conditions make this a particularly good moment to evaluate these endeavors and look to the future:

- In the spring and summer of 2000, the international community gathered to assess the promises made in the plan of action passed five years before at the United Nations' Fourth World Conference on Women held in Beijing. Issues concerning women and technology were put forth as essential parts of many of the goals outlined in the plan of action.
- The success of the Human Genome Project and other advances mark a leap in technology, particularly in biotechnology where women are poised to make significant contributions because of the relatively large number of women in the field. In health research, a National Institute of Medicine report "Does Sex Matter?" confirmed that gender differences affect not only the sexual reproductive capacities of humans but biological functions from "womb to tomb." The differences start at the cellular level and must be taken into account more broadly at all levels in biomedical and health research.
- Critical national debates are joined today over such issues as affirmative action and funding for science and technology research; women have a great stake in these policy discussions.
- Women and men in science and technology today seriously question the trade-offs demanded of them in terms of their work and family life, particularly in the demanding postgraduate training stages of their careers.

Even with the considerable progress made by women and girls in science and technology, too many women still feel they learn and work in unfriendly or hostile environments in labs and other technological workplaces. However, in all fields and in major technology corporations, women have formed national organizations and networks to support each other, develop visible leadership for change and advance an agenda of equity. These groups have made considerable efforts to reach out to women and girls of diverse ethnic and racial backgrounds and to those isolated because of cultural factors or geography.

421 East Dunklin Street ~ P.O. Box 1684
Jefferson City, Missouri 65102

Toll Free in MO: (877) 426-9284 ~ Phone: (573) 751-0810 ~ Fax: (573) 751-8835
Web Site: www.womenscouncil.org ~ E-mail: wcouncil@mail.state.mo.us

K-12 Elementary and Secondary Education

What We Know:

- In 1999, 56% of Advanced Placement test takers were female, but 90% of computer science test takers and 78% of physics C test takers were male.
- Girls are more successful in math and science programs that incorporate a cooperative, hands-on approach than in programs that stress competition and individual learning.
- Twenty-five years ago, girls comprised approximately 25% of the Science Talent Search* finalists; by 1999, the girls constituted 45%. The winners of the Intel Science Talent Search in 1999, 2000 and 2001 were girls. (*Formerly known as the Westinghouse Science Talent Search.)
- By eighth grade, Latinas have higher math scores than their male peers; and by twelfth grade they do better in science than Latinos, but they are outperformed by their male peers on the Math SATs.
- Strategies that increase girls' success in the sciences are also effective with boys, especially those from under-represented groups.
- Girls tend to use computers in ways different from boys. Most software developers target boys as the end users.

What We Need:

- Community-wide involvement: Communities must invest in science and technology literacy at all levels, provide resources for teachers to develop their science careers, and actively encourage parents to promote their daughters' interest in science and technology.
- Inclusive teaching styles: At all levels – the state, district, PTA, principal, teacher, parent – the school system must encourage gender-equitable teaching practices that recognize the experiences and learning styles of girls and young women.
- School-based mentoring programs: Schools need to identify and encourage visible role models for women and girls and institute mentoring programs.
- An interdisciplinary focus: Teachers should emphasize how technology, like computers, can be integrated into other fields, such as politics, ecology and health, to spark girls' interest.
- Demonstration of human links: Teachers should illustrate the people-helping and society-advancing aspects of science and technology.

Undergraduate Education

What We Know:

- There has been a steep decline in women's participation in undergraduate computer science. In 1984, women earned 37% of undergraduate computer science degrees. In 1999, women earned less than 20% of computer science degrees.
- In 1996, women earned 53% of undergraduate degrees in biology and 46% of degrees in math and statistics, but just 19% of physics degrees and 18% of engineering degrees.
- African American women earn proportionally more science and engineering undergraduate degrees than African American men. The same is true for Latinas and Native American women compared to their male peers, but does not hold true for Caucasian and Asian women.
- Programs to support women in engineering have contributed to their rise from 2% of undergraduate engineering degree recipients in the 1970s to 18% by the 1990s.

What We Need:

- Exercise leadership at all levels to mandate gender equitable practices: Colleges and universities must commit adequate resources to sustain and expand programs that advance women and other underrepresented groups in the sciences and engineering.
- Curriculum adjustment: Colleges and universities should reform curricula to replace gatekeeping courses with more welcoming introductory courses, accommodate late bloomers, and offer opportunities for cross-disciplinary studies that include science and technology.
- Mentoring programs and role models: Colleges and universities should invest in formal mentoring programs starting with first-year students. Visible role models who demonstrate that careers in the sciences can be personally satisfying and also benefit society are critical.
- Revamped admissions policies: Administrators must examine admissions practices that perpetuate bias through an over-reliance on test scores and Advanced Placement grades.